

Claims

1. A transmission electric power control method of controlling a maximum transmission electric power during transmission of a plurality of signals in a code-multiplexing fashion,

wherein, when code multiplexing is used to transmit signals from a first transmission channel to transmit data, a second transmission channel to transmit main control information, and a third transmission channel to transmit additional control information and when first, second, and third gain factors are used to weight signals from said first, second, and third transmission channels, a maximum transmission electric power is decreased at a plurality of levels based on a ratio between said first and second gain factors and a ratio between said second and third gain factors.

2. The transmission electric power control method according to claim 1,

wherein the backoff amount of maximum transmission electric power is decreased as a ratio of said second gain factor to said first gain factor decreases.

3. The transmission electric power control method according to claim 1 or 2,

wherein the backoff amount of maximum transmission electric power is decreased as a ratio of said third gain factor

to said second gain factor decreases.

4. A transmission electric power control method of controlling a maximum transmission electric power during transmission of a plurality of signals in a code-multiplexing fashion,

wherein code multiplexing is used to transmit signals from a first transmission channel to transmit data, a second transmission channel to transmit main control information, and a third transmission channel to transmit additional control information, said method comprising the steps of:

checking whether or not transmission data is available;

when no transmission data is available, using first, second, and third gain factors to weight signals from said first, second, and third transmission channels and decreasing a maximum transmission electric power at a plurality of levels based on a ratio between said second and third gain factors; and

when transmission data is available, decreasing a maximum transmission electric power at a plurality of levels based on said second gain factor and a ratio between said second and third gain factors.

5. The transmission electric power control method according to claim 4,

wherein a backoff amount for unavailability of transmission data is configured to be larger than that for

availability of transmission data.

6. The transmission electric power control method according to claim 4 or 5,

wherein a backoff amount of maximum transmission electric power is decreased as a ratio of said third gain factor to said second gain factor decreases.

7. The transmission electric power control method according to claim 1 or 4,

wherein said maximum transmission electric power is decreased under control of an automatic gain control circuit disposed previously to a power amplifier.

8. A transmission electric power control method of controlling a maximum transmission electric power during transmission of a plurality of signals in a code-multiplexing fashion,

wherein code multiplexing is used to transmit signals from a first transmission channel to transmit data, a second transmission channel to transmit main control information, and a third transmission channel to transmit additional control information, said method comprising the steps of:

checking a requested transmission electric power; and

when a requested transmission electric power is greater than or equal to a threshold value close to a maximum transmission electric power, clipping a transmission signal

using a base band at a plurality of levels in accordance with magnitude of a requested transmission electric power.

9. The transmission electric power control method according to claim 8.

wherein first, second, and third gain factors are used to weight signals from said first, second, and third transmission channels, and values of said first, second, and third gain factors are converted so as to normalize an output power value for a transmission signal of said base band.

10. The transmission electric power control method according to claim 1, 4, or 9,

wherein said transmission electric power control method is used for a mobile device and said additional control information is equivalent to mobile device's reception quality information transmitted to a base station by a mobile device so as to improve a data transmission rate from a base station to a mobile device and/or a reception determination result of received data.

11. A transmission electric power control apparatus for controlling a maximum transmission electric power during transmission of a plurality of signals in a code-multiplexing fashion, said apparatus comprising:

first spreading means for providing a first spreading process to signals from a first transmission channel to transmit

data, a second transmission channel to transmit main control information, and a third transmission channel to transmit additional control information;

weighting means for weighting signals from said first, second, and third transmission channels after said first spreading process with first, second, and third gain factors, respectively;

complex mapping means for complex-mapping said weighted signals from channels;

second spreading means for providing a second spreading process to output from said complex mapping means;

a filter for limiting a band for output from said second spreading means;

digital-analog conversion means for converting output from said filter into an analog signal;

modulation means for providing a specified modulation process to output from said digital-analog conversion means;

automatic gain control means for controlling an amplification gain with respect to output from said modulation means;

electric power amplification means for electrically amplifying output from said automatic gain control means; and

main control means for using when first, second, and third gain factors to weight signals from said first, second, and third transmission channels and decreasing a maximum transmission electric power at a plurality of levels based on a ratio between said first and second gain factors and a ratio

between said second and third gain factors.

12. A transmission electric power control apparatus for controlling a maximum transmission electric power during transmission of a plurality of signals in a code-multiplexing fashion, said apparatus comprising:

first spreading means for providing a first spreading process to signals from a first transmission channel to transmit data, a second transmission channel to transmit main control information, and a third transmission channel to transmit additional control information;

weighting means for weighting signals from said first, second, and third transmission channels after said first spreading process with first, second, and third gain factors, respectively;

complex mapping means for complex-mapping said weighted signals from channels;

second spreading means for providing a second spreading process to output from said complex mapping means;

a filter for limiting a band for output from said second spreading means;

digital-analog conversion means for converting output from said filter into an analog signal;

modulation means for providing a specified modulation process to output from said digital-analog conversion means;

automatic gain control means for controlling an amplification gain with respect to output from said modulation

means;

electric power amplification means for electrically amplifying output from said automatic gain control means; and

main control means for checking availability of transmission data for transmission of signals from said first, second, and third transmission channels, decreasing a maximum transmission electric power at a plurality of levels based on a ratio between said second and third gain factors when no transmission data is available, and decreasing a maximum transmission electric power at a plurality of levels based on said second gain factor and a ratio between said second and third gain factors when transmission data is available.

13. The transmission electric power control apparatus according to claim 11 or 12,

wherein said main control means controls said automatic gain control means to decrease said maximum transmission electric power.

14. A transmission electric power control apparatus for controlling a maximum transmission electric power during transmission of a plurality of signals in a code-multiplexing fashion, said apparatus comprising:

first spreading means for providing a first spreading process to signals from a first transmission channel to transmit data, a second transmission channel to transmit main control information, and a third transmission channel to transmit

additional control information;

weighting means for weighting signals from said first, second, and third transmission channels after said first spreading process with first, second, and third gain factors, respectively;

complex mapping means for complex-mapping said weighted signals from channels;

clipping means for clipping output from said complex mapping means to a specified level;

second spreading means for providing a second spreading process to output from said clipping means;

a filter for limiting a band for output from said second spreading means;

digital-analog conversion means for converting output from said filter into an analog signal;

modulation means for providing a specified modulation process to output from said digital-analog conversion means;

automatic gain control means for controlling an amplification gain with respect to output from said modulation means;

electric power amplification means for electrically amplifying output from said automatic gain control means; and

main control means for controlling said clipping means so as to clip output from said complex mapping means complex mapping means at a plurality of levels according to magnitude of a requested transmission electric power when said power is greater than or equal to a threshold value close to a maximum

transmission electric power.

15. The transmission electric power control apparatus according to claim 14,

wherein said main control means converts values of said first, second, and third gain factors so as to normalize an output power value for said complex mapping means.

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